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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Marc J.R. LEBLANS, *et al.*
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Title	:	APPARATUS AND METHOD FOR PERFORMING AUTOFOCUSING IN A MICROSCOPE
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August 22, 2003
(Date of Deposit)

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(Name of applicant, assignee, or Registered Representative)

(Signature)

August 22, 2003
(Date of Signature)

Honorable Commissioner of Patents
Alexandria, Virginia 22313-1450

AMENDMENT AND RESPONSE 22AUG2003

Dear Sir:

In response to the Office Action dated May 30, 2003 (hereinafter the "Office Action"), Applicants respectfully submit the following remarks. No amendments are hereby introduced. A list of the pending claims is provided hereinbelow:

1-4. (canceled)

5. (previously presented) An apparatus for automatically focusing an image of an object plane in a microscope, comprising:

an optical system configured to form an image of an object plane to be observed, said optical system comprising:

an objective lens configured to focus on the object plane,

an illumination beam source for illuminating the object plane with an illumination light beam of a first wavelength, and

an image lens configured to create an image of the object plane;

an autofocusing detection system comprising:

an autofocusing light beam source for generating an autofocusing light beam of a second wavelength,

a beamsplitter configured to direct the autofocusing light beam to the object plane and cause the autofocusing light beam to reflect off the object plane,

a detection system lens configured to direct the reflected autofocusing light beam to an autofocusing detection device, and

an autofocusing detection device for determining the amount of displacement of the image of the object plane in the optical system from a desired focused reference plane based on the detected displacement of an image plane of the reflected autofocusing light beam from a predetermined reference plane in the autofocusing detection system, said autofocusing detection device comprising at least one sensor for sensing the reflected autofocusing light beam and detecting the displacement of the image plane and an iris for permitting the reflected autofocusing light beam to pass at least partially though an aperture of the iris, said at least one sensor measuring the intensity of the reflected autofocusing light beam that passes through the aperture of the iris, wherein the iris is positioned such that it is displaced from the focal distance from the detection system lens and wherein the sensor is positioned adjacent the aperture of the iris, and wherein the autofocusing detection device further comprises an auxiliary beam splitter and an auxiliary light sensor, the auxiliary beam splitter positioned between the detection system lens and the iris, the auxiliary beam splitter configured to reflect a fraction of the reflected autofocusing light beam to the auxiliary light sensor; and

a focusing correction system comprising a feedback controller and focus adjusting device for automatically adjusting the distance between the objective lens and the object plane, based on the reflected autofocusing light beam sensed by said at least one sensor, in order to properly focus the image in the optical system.

6. (original) The apparatus of claim 5, wherein the displacement of the reflected autofocusing light beam from the predetermined reference plane is calculated based on the light intensities measured by the light sensor and auxiliary light sensor, and wherein the feedback controller calculates the displacement of the image from the desired focused reference plane based on the displacement of the reflected autofocusing light beam from a predetermined reference plane.

7-20. (canceled)

21. (previously presented) A system for automatically focusing an image in a microscope, comprising:

an imaging system for creating an image of an object plane using an illumination light beam of a first wavelength; and

an autofocusing detection system, said autofocusing detection system comprising:

an autofocusing light beam of a second wavelength, the autofocusing light beam being directed to reflect off of the object plane;

an autofocusing detection device comprising an iris and a light detector; and

a detection system lens for directing the reflected autofocusing light beam to the autofocusing detection device, the autofocusing detection device receiving the reflecting autofocusing light beam from the detection system lens, said iris permitting at least a portion of the reflected autofocusing light beam to pass through an aperture of said iris, and said light detector measuring the intensity of the portion of the reflected autofocusing light beam that passes through the aperture of the iris in order to detect the distance that the image of the object plane in the imaging system is displaced from a desired focus reference surface wherein the iris is positioned such that it is displaced from the focal distance from the detection system lens and wherein the light detector is positioned adjacent to the aperture of the iris, and wherein the autofocusing detection device further comprises an auxiliary beam splitter and an auxiliary light detector, the auxiliary beam splitter positioned between the detection system lens and the iris, the auxiliary beam splitter configured to reflect a fraction of the reflected autofocusing light beam to the auxiliary light detector.

22 – 50. (canceled)

51. (previously presented) A microscope for viewing an object plane, comprising:

a plurality of lenses positioned along a main optical axis of the microscope;

a probe arm supporting the plurality of lenses, said probe arm extending generally along the main optical axis;

a support on which an object with an object plane to be examined is placed, the object plane substantially extended along a focus plane that is observed through the microscope; and

an optical output device for creating an image of the object plane on an image plane,

wherein the main optical axis is unfolded and substantially extends along a single plane;

a scanning stage, said probe arm configured to be substantially isolated from vibrations created by the scanning stage, wherein the scanning stage and object are positioned on a separate support structure than the probe arm of the microscope, each separate support structure being substantially vibrationally isolated from each other, and

wherein the object to be examined is positioned on a support connected to the separate support structure of the scanning stage and said probe arm positioned between the object to be examined and the scanning stage.

52. (previously presented) A microscope for viewing an object plane, comprising:

a plurality of lenses positioned along a main optical axis of the microscope;

a probe arm supporting the plurality of lenses, said probe arm extending generally along the main optical axis;

a support on which an object with an object plane to be examined is placed, the object plane substantially extended along a focus plane that is observed through the microscope; and

an optical output device for creating an image of the object plane on an image plane,

wherein the main optical axis is unfolded and substantially extends along a single plane, wherein the probe arm is substantially elongated so that the optical output device may be positioned distant from the object to be examined.